

6-26-87

WA-2917

7a

6/26/1987

RCRA PERMIT
ADMINISTRATIVE RECORD
ITEM NUMBER
TOTAL NUMBER OF PAGES

FILE COPY

SUMMARY LETTER
MONITOR WELL INSTALLATION
PROPOSED FACILITY EXPANSION
SEATTLE, WASHINGTON
FOR
CITY ICE AND COLD STORAGE COMPANY



USEPA RCRA



3012543

GeoEngineers
Incorporated



**GeoEngineers
Incorporated**

Consulting Geotechnical
Engineers and Geologists

(206) 746-5200
Fax: (206) 746-5068
2405 - 140th Ave. N.E.
Bellevue, WA 98005

June 26, 1987

City Ice and Cold Storage Company
259 Coleman Building
Seattle, Washington 98104

Attention: Mr. John C. Rosling, President

Gentlemen:

Summary Letter
Monitor Well Installation
Proposed Facility Expansion
Seattle, Washington
File No. 1074-02-1

This letter summarizes the results of monitor well installation in the area of proposed expansion of your facilities at Pier 91. The purpose of the monitoring well is to determine if the hydrocarbon contamination detected in Boring 2 in our geotechnical studies (GEI report dated February 10, 1987) extends beneath the planned building area. Specifically, our services include:

1. Drilling one monitor well to a depth of 20 feet near the southeast corner of the relocated building footprint, as located by Mr. Gary Ostle. Two-inch-diameter casing was set in the borehole for subsequent observation of ground water levels, vapor concentration readings and observations for the presence of free hydrocarbon product on the water.

2. A return trip was made to the site 5 days after well completion to measure vapor concentrations, record the ground water level, and observe the presence of free product, if any. Laboratory testing was not included in the scope of services.

DRILLING AND SOIL SAMPLING PROGRAM

GENERAL

The monitor well was drilled approximately 55 feet northwest of Boring B-2, as shown on Figure 1. The boring was drilled on June 18, 1987 to a depth of 20 feet using truck-mounted, hollow-stem auger drilling equipment owned and operated by Soil Sampling Service, Inc.

A geological engineer from our staff determined the boring location, examined and classified the soils encountered, and prepared a detailed log. Soils encountered were classified visually in general accordance with ASTM D-2487-83, which is described in Figure 2. An explanation of the monitor well log symbols is presented in Figure 3. The monitor well log is presented in Figures 4 and 5.

Relatively undisturbed soil samples were obtained at approximately 5-foot intervals using a Dames & Moore split-barrel sampler (2.4-inch-ID). The sampler was driven 18 inches by a 300-pound weight falling a vertical distance of approximately 30 inches. The number of blows needed to advance the sampler the final 12 inches is indicated to the left of the corresponding sample notations on the boring log.

MONITOR WELL CONSTRUCTION

Two-inch-diameter, Schedule 40 PVC pipe was installed in the at the completion of drilling. The lower 17 feet of pipe is machine slotted (0.02-inch slot width) to allow entry of water and/or floating hydrocarbons. Medium to coarse sand was placed in the borehole annulus surrounding the slotted portion of the well. Monitor well construction is indicated in Figures 4 and 5.

GROUND WATER ELEVATIONS

The water level was measured at 5.8 feet below the existing ground surface on June 23, 1987. Water levels are expected to vary with tidal and seasonal influences.

FLAMMABLE VAPOR CONCENTRATIONS

Vapor concentrations in the well were also measured on June 23, 1987 using a Bacharach TLV Sniffer which is calibrated to methane. A flammable vapor reading of 900 parts per million (ppm) was measured. Free hydrocarbon products on the water were not observed.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the monitor well boring, the hydrocarbon contamination detected in Boring 2 during our geotechnical studies extends beneath the planned building area. The vapor concentration recorded is sufficiently high so that certain precautions should be taken in design and during construction. Specifically, we recommend the following:

1. Vapor concentrations in the work zone, especially in any excavations, should be monitored during construction.
2. Ventilation capable of reducing concentrations to below 5 ppm should be provided if vapor concentrations exceed this load. Active ventilation using blower fans, etc. may be necessary.
3. The allowable threshold of vapor concentrations can be increased to between 300 and 500 ppm if the vapor is positively identified as a "fuel" product vapor. This can be determined by analyzing a vapor sample from the monitoring well to determine the specific gases present.
4. There is a potential that hydrocarbon vapors could accumulate beneath the building floor slab. This would be especially true if equipment pits, elevator shafts or crawl spaces will be constructed below floor slab level. We recommend that this potential be carefully evaluated during design and that venting systems be provided, as appropriate.

City Ice and Cold Storage Company
June 26, 1987
Page 4

5. We recommend that the vapor concentrations in the monitor well be measured biweekly until construction is started. This will provide a basis for determining if underslab venting should be provided. If so, we will provide recommendations for design of the venting system.

LIMITATIONS

We have prepared this letter for use by City Ice and Cold Storage Company, their architects and engineers, and Derek Arndt Construction for use in design of a portion of this project. This letter may be provided to prospective contractors for their bidding or estimating purposes.

We recommend that our firm review the design drawings and specifications for slab venting/lining system, if used, when the design is finalized.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practice in this area at the time this letter was prepared. No other conditions, express or implied, should be understood.

- o o o -

City Ice and Cold Storage Company
June 26, 1987
Page 5

We appreciate the opportunity to be of service. Please call if you have any questions regarding this letter.

Yours very truly,

GeoEngineers, Inc.



James E. Brigham
James E. Brigham
Project Engineer

Jack K. Tuttle
Jack K. Tuttle
Principal

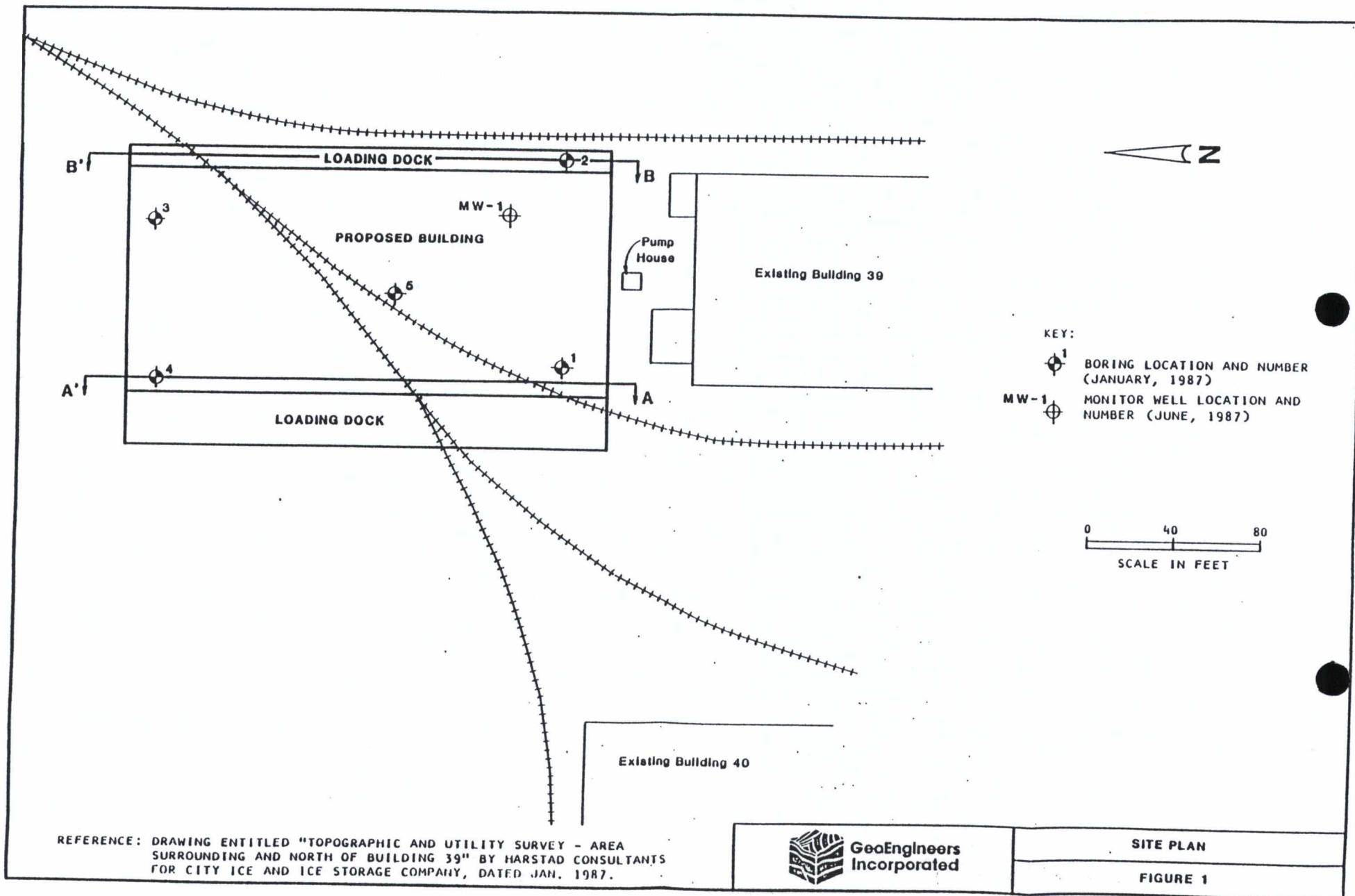
JEB:JKT:da

Four copies submitted

Attachments

cc: Derek Arndt Construction
11060 - 118th Place N.E.
Kirkland, WA 98033
Attn: Mr. Gary Ostle

**GeoEngineers
Incorporated**



SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
	GRAVEL WITH FINES	GM	SILTY GRAVEL	
		GC	CLAYEY GRAVEL	
	SAND MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS MORE THAN 50% PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50	INORGANIC	ML	SILT
			CL	CLAY
	ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY	
	SILT AND CLAY LIQUID LIMIT 50 OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-83.
2. Soil classification using laboratory tests is based on ASTM D2487-83.
3. Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry - Absence of moisture, dusty, dry to the touch

Moist - Damp, but no visible water

Wet - Visible free water or saturated, usually soil is obtained from below water table



**GeoEngineers
Incorporated**

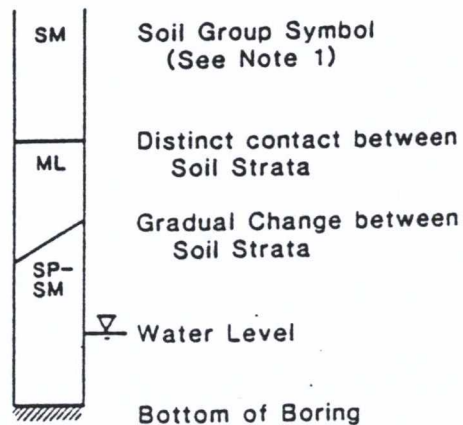
SOIL CLASSIFICATION SYSTEM

FIGURE 2

LABORATORY TESTS:

AL Atterberg limits
 CP Compaction
 CS Consolidation
 DS Direct shear
 GS Grain-size analysis
 HA Hydrometer analysis
 K Permeability
 M Moisture content
 MD Moisture and density
 SP Swelling pressure
 TX Triaxial compression
 UC Unconfined compression

SOIL GRAPH:



BLOW-COUNT/SAMPLE DATA:

Blows required to drive sampler
 12 inches or other indicated
 distances using 300 pound
 hammer falling 30 inches.

"P" indicates sampler pushed with
 weight of hammer or hydraulics
 of drill rig.

- 22 ☒ Location of relatively undisturbed sample
- 12 ☒ Location of disturbed sample
- P ☐ Location of sampling attempt with no recovery
- 10 ☒ Location of sample attempt using Standard Penetration Test procedures

NOTES:

1. Soil classification system is summarized in Figure
2. The reader must refer to the discussion in the report text as well as the exploration logs for a proper understanding of subsurface conditions.



GeoEngineers
 Incorporated

KEY TO BORING LOG SYMBOLS

FIGURE 3

MONITOR WELL NO. MW-1

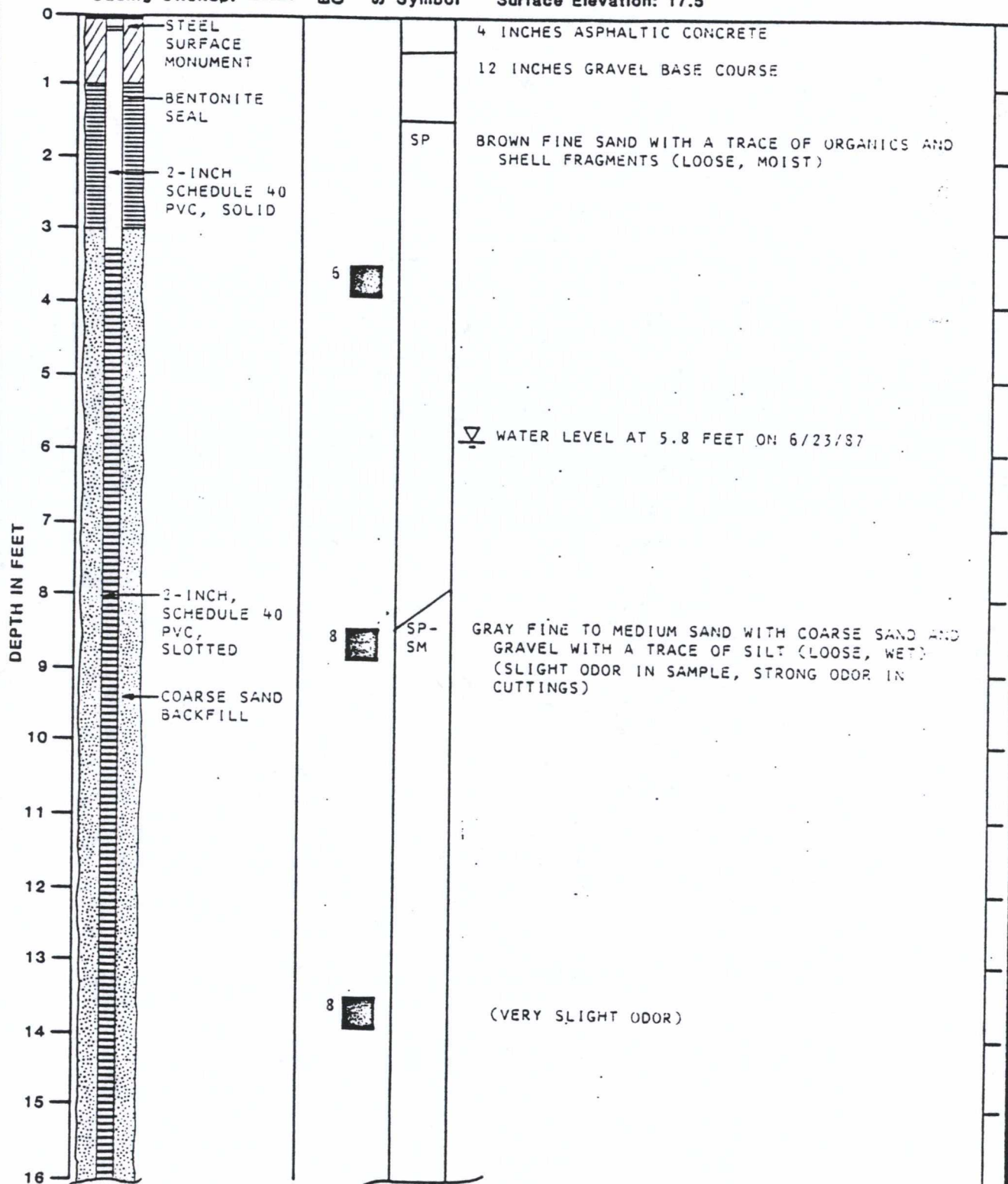
WELL SCHEMATIC

Casing Elevation: 17.5
Casing Stickup: _____

Blow-
Count
Samples
Group
Symbol

DESCRIPTION

Surface Elevation: 17.5



Note: See Figure 3 for Explanation of Symbols



GeoEngineers
Incorporated

LOG OF MONITOR WELL

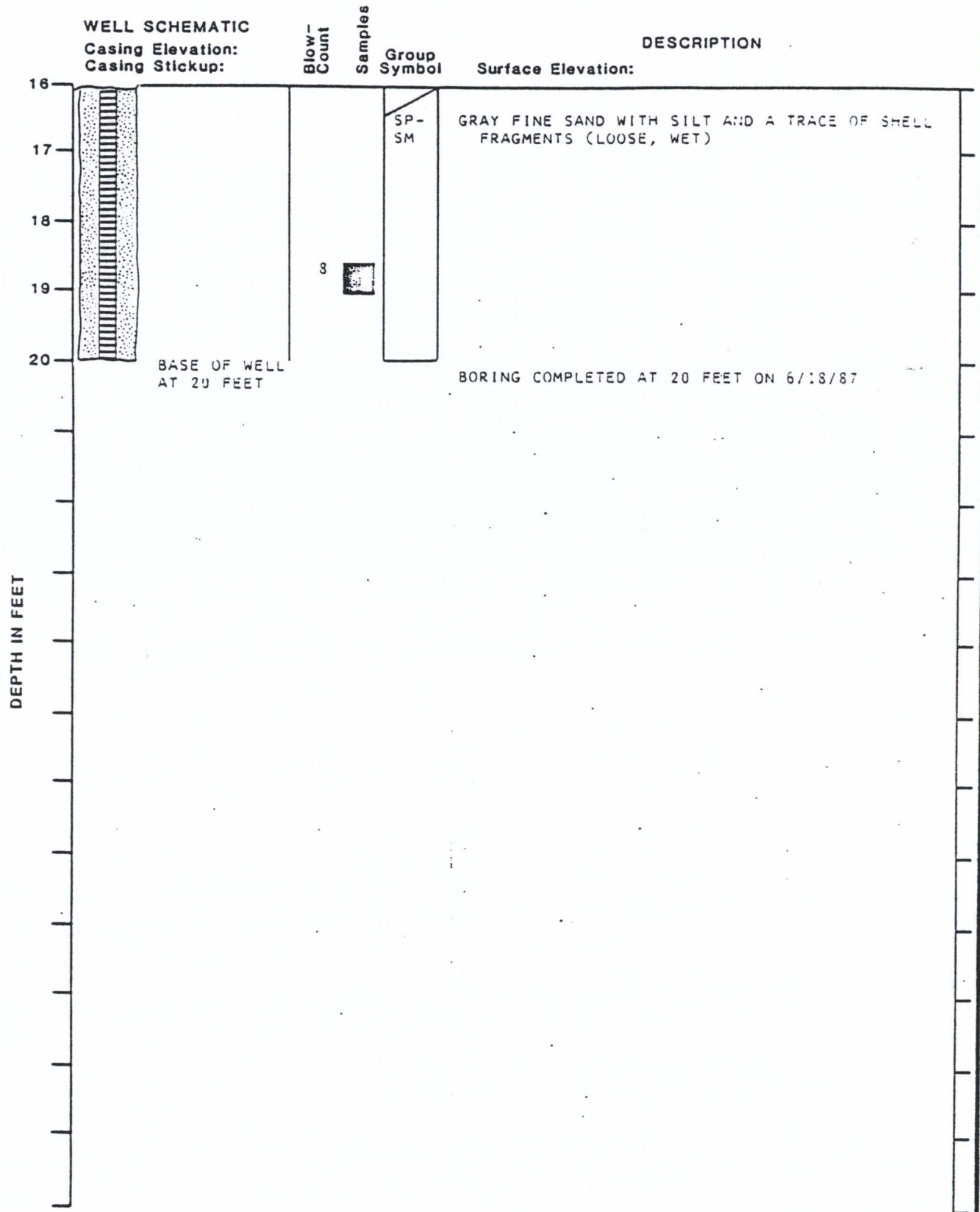
FIGURE 4

6/25/87

KSK:JEB:EL

1074-02-1

MONITOR WELL NO. MW-1



Note: See Figure 3 for Explanation of Symbols



GeoEngineers
Incorporated

LOG OF MONITOR WELL

FIGURE 5

6/25/87

KSK:JUB:LL

1074-02-1

PORT OF SEATTLE
MEMORANDUM

DATE: August 13, 1987
TO: Walter D. Ritchie, Chief Engineer
FROM: Frank H. Clark, Director, Marine Terminals
SUBJECT: City Ice and Cold Storage Company
Proposed Monitor Well Installation

Please review and comment on the attached tenant proposal. Jim Rice is the Marine Terminals' contact at 3376. Thanks.

JR/7476R/jck

Attachment

cc: [✓] B. Wells w/attachment